

Big Ox Energy: Weekend Operational Fluctuations

Aside from equipment breakdowns, there is a consistent occurrence that continues to plague both the City of Sioux City Wastewater Treatment Plant and Big Ox Energy Siouxland and has led to several instances of BOE discharging loads of TSS that have surpassed the WWTP's entire allocation for industrial TSS and has led to the city issuing violations.

Big Ox regularly struggles to treat its waste water to acceptable levels on weekends. This is due to fluctuations in the industrial loads that they receive. This is my understanding of how one industry halting discharge to Big Ox each weekend causes Big Ox to struggle to remove solids and other pollutants from its wastewater prior to discharging to the City.

Big Ox generates biogas from receiving hauled-in food waste as well as from two industries that directly discharge their wastewater to Big Ox which they remove grease and solids to use for biogas production. One Firm, Beef Products Incorporated (BPI), is responsible for most of Big Ox's influent volume. BPI discharges an average of .962 MGD. This company ceases operations each Saturday evening.

When Big Ox receives waste, the primary goal is removal of grease and suspended solids for anaerobic digestion and biogas generation. This is done by using a Gas Energy Mixer (GEM). The GEM functions much like a DAF using dissolved air to separate solids prior to discharge. In addition to using the GEM for industrial solids removal, the GEM also functions to further remove filtrate solids from the centrifuges used to thicken anaerobic digester sludge. These two streams coming in the GEM and are discharged to the City following solids removal.

During normal operations, the raw industrial wastewater will blend with the centrifuge filtrate solids for removal in the GEM. Without this dilution from BPI, the GEM struggles to treat the higher concentration of the filtrate. Adjustments can be made, but often take a prolonged period for them to take effect. Once the wastewater reaches the GEM, the effluent is then discharged directly to the Sioux City POTW. There is currently no redundancy for the GEM should there be a mechanical or operational issue. There are no clarifiers, screens, or filters to safeguard against extreme loadings or process issues. Capacity also limits how long they can shut down the GEM until repairs/adjustments are made or else influent may overflow the EQ/GEM feed tank and discharge raw industrial water directly to the POTW.

The City has asserted that more effort need to be placed in correcting this issue. Big Ox has been making gradual progress to improve weekend operations with the ability to recirculate a portion of the GEM effluent should they encounter higher solids concentration as well as improving training for GEM operation and maintenance.